

Identify density-dependent and density-independent limiting factors that affect populations in an ecosystem.

ELIGIBLE CONTENT

- Identify the limiting factors that affect populations in an ecosystem as either density-dependent or density-independent including natural disasters, space, food, water, air, abiotic and biotic factors, human activity, disease and succession.
 - Limiting factors**- anything that controls or limits the size of a population EX. food or water availability, disease, habitat
 - limiting factors create an *S shaped curve* when a population reaches its **carrying capacity** (number of organism an area can support).
 - density dependent** limiting factors such as disease, food, water, space, parasites that affect the size of a population or the growth of a population...limited amounts of food or water will limit the size of a population...the more animals, the less food or water will be available thus the population size is limited, EX. the more predators will mean less prey
 - density independent** limiting factors such as drought, flood, hurricanes, storms, habitat destruction, building construction...will affect all organisms no matter the size of the population EX. No matter how many earthworms are in a field, they will all drown if there is a flood.
 - population**- one kind of organism living in a certain area
 - succession**- change of a population or an area over time EX. Grass field to hardwood forest

Standard 16 AHSGE

Worksheet Questions

1. Which situation is caused by a density dependent limiting factor?
 - a. The influenza outbreak of 1918-1919 killed over 20 million people.
 - b. The cones of a jack pine need heat from a fire to help release seeds.
 - c. A parasite alters reproduction in a woodpecker population causing fewer births.
 - d. A queen bee regulates the number of eggs she lays according to the amount of food available.
2. Which limiting factor is density-independent for rainbow trout?
 - a. size of stream
 - b. spread of parasites
 - c. competition for food
 - d. supply of dissolved oxygen
3. Which statement BEST describes the relationship between natural disasters or human-caused disasters and population size?
 - a. Natural and human-caused disasters are density dependent factors.
 - b. Natural and human-caused disasters are density-independent factors.
 - c. Human-caused disasters are density-independent whereas natural disasters are density-dependent.
 - d. Human-caused disasters are density-dependent whereas natural disasters are density-independent.
4. Which relationship BEST identifies a density-dependent limiting factor?
 - a. A bobcat population declines due to disease.
 - b. A fish population declines due to severe drought.
 - c. A bird population declines due to pollution.
 - d. A wolf population declines due to a cold winter.
5. Mr. Puckett feeds his guppies (fish) $\frac{1}{2}$ teaspoon of food every day. His guppy population has been stable with about 10 guppies for the past year. Mrs. Preuit takes over the morning feeding and starts feeding the guppies one teaspoon of food per day. After four months, the guppy population is over 33 guppies. Which of these statements is supported by this data?
 - a. The size of the aquarium was a limiting factor.
 - b. Mr. Puckett was starving his guppies.
 - c. One half teaspoon of food was a limiting factor.
 - d. Guppies reproduce rapidly.
6. When Mrs. Preuit increased the amount of food, what happened to the carrying capacity of the aquarium?
 - a. it increased
 - b. it decreased
 - c. it stayed the same
 - d. nothing
7. An uncut field becomes a meadow, then a pine forest, then eventually a hardwood forest. This is called _____.
 - a. estuary
 - b. succession
 - c. photosynthesis
 - d. intertidal

Study the table below. Gypsy moth caterpillars can destroy trees by eating too many leaves and making them susceptible to disease or drought. Which student has correctly identified the density-dependent and density-independent limiting factors associated with an invasion of gypsy moth caterpillars?

Forest Ecosystem Factors

Student	Population of Gypsy Moth Caterpillars	Disease	Drought
1	density-independent	density-dependent	density-dependent
2	density-dependent	density-independent	density-independent
3	density-independent	density-independent	density-dependent
4	density-dependent	density-dependent	density-independent

- A student 1
- B student 2
- C student 3
- D student 4

7. Which type of management would provide the BEST short-term control of giant salvinia?

Giant Salvinia	
Description	aquatic fern that forms floating mats that shade and overcrowd native plants
Where Found	bodies of water in the southern region of the United States
Method of Distributing and Reproducing	reproduces by distributing fragments that break off when disturbed
Rate of Reproduction	can double its surface area in five to seven days
Problems Associated with Giant Salvinia	threatens water quality and oxygen supplies for native plants and animals

- A Add more fish to lakes containing giant salvinia.
- B Educate people about how fast giant salvinia reproduce.
- C Introduce new plant species into areas where giant salvinia is spreading.
- D Clean propellers before moving boats from a lake containing giant salvinia.

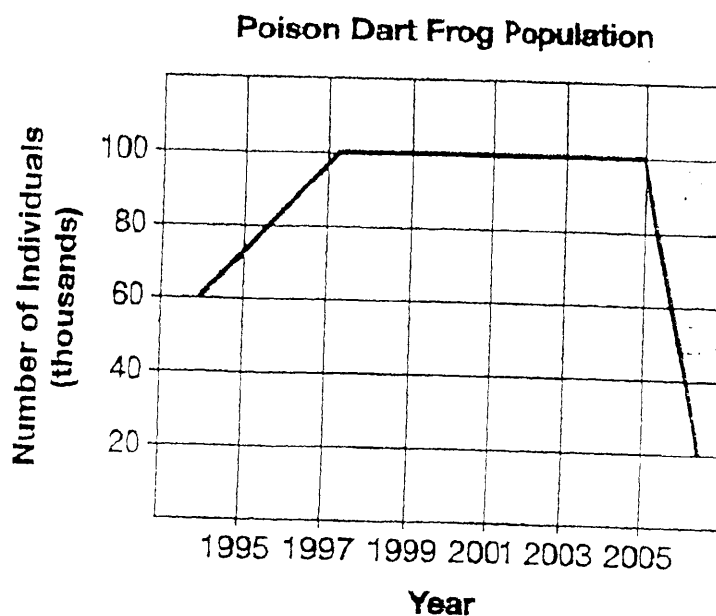
Name _____

Date _____

10. The front page of a newspaper in November 2006 had these headlines.

- Laws Limiting Deforestation Begin Third Year
- Earthquake Rocks Region
- Rainforest Snake Population Declines Due to Deadly Virus

The newspaper also featured a graph showing the population of the poison dart frog.



According to the information in the newspaper, which limiting factor MOST LIKELY accounts for the change in the frog's population?

- a. disease b. predation c. natural disaster d. human activity

11. Study the table below. Which student identified only density-independent limiting factors?

Students' Identification of Density-Independent Limiting Factors					
Student	Disease	Clear-cutting	Predation	Filling Wetlands	Natural Disaster
1	x	x			x
2		x	x		x
3	x		x	x	
4		x		x	x

- a. student 1 b. student 2 c. student 3 d. student 4

1. Which statement BEST explains why a disease may affect one population more than another population?

- a. Because a disease is a density-dependent limiting factor, a larger population makes it easier for the virus to spread from person to person.
- b. Because a disease is a density-independent limiting factor, a larger population makes it easier for the virus to spread from person to person.
- c. Because a disease is a density-dependent limiting factor, climate can influence the disease, making it more or less affective.
- d. Because a disease is a density-independent limiting factor, climate can influence the disease, making it more or less affective.